

DOCUMENT RESUME

ED 237 206

PS 013 953

AUTHOR McDermott, Marilyn
TITLE The Impact of Classroom Interaction Patterns on Students' Achievement-Related Beliefs and Behaviors.
PUB DATE Apr 83
NOTE 19p.; Paper presented at the Biennial Meeting of the Society for Research in Child Development (Detroit, MI, April 21-24, 1983).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Classroom Communication; Classroom Observation Techniques; *Expectation; Feedback; Junior High Schools; *Junior High School Students; *Mathematics Achievement; Questionnaires; Secondary School Teachers; *Sex Bias; Sex Differences; *Teacher Behavior; Teacher Influence

ABSTRACT

An investigation was made to determine whether teacher expectations influence the way teachers interact with students and, if they do, to assess what effects teacher behavior might have. Also addressed was the question of whether teachers treat males and females differently in ways that may discourage females in math. All teacher/student interactions occurring in a seventh-, an eighth-, and a ninth-grade math class were observed for 10 days each; students and teachers completed questionnaires the year the observations were made and the following year. Student questionnaires measured attitudes, perceptions, values, plans, and conceptions of and about mathematics. Teacher questionnaires elicited teachers' math-related expectations for each student. On the basis of teacher ratings, students were divided into high and low expectancy groups. Results of analyses of variance indicated that high expectancy students received more feedback than did low expectancy students, whereas low expectancy students received more total criticism. Low expectancy females received more teacher attention than did high expectancy females, and males rated high received equal amounts or more attention than did males rated low. Students were found to contribute to classroom interactions by choosing to initiate interactions with teachers and by variously interpreting teacher behavior. Results suggested that teachers could provide more feedback to encourage females in math and to improve males' interaction patterns. (PH)

* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *

X This document has been reproduced as
received from the person or organization
originating it.

Minor changes have been made to improve
reproduction quality.

• Points of view or opinions stated in this docu-
ment do not necessarily represent official NIE
position or policy.

ED237206

THE IMPACT OF CLASSROOM INTERACTION PATTERNS
ON STUDENTS' ACHIEVEMENT-RELATED
BELIEFS AND BEHAVIORS

by

Marilyn McDermott

Paper Presented at Biennial Meeting of
Society for Research in Child Development
April, 1983

"PERMISSION TO REPRODUCE THIS
MATERIAL HAS BEEN GRANTED BY

Marilyn
McDermott

TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC)."

PS 013953

Teacher expectations and behavior have long been studied and debated as a source of differences in student performance and achievement, largely owing to Rosenthal and Jacobson's 1968 Pygmalion in the Classroom. The data reported here, part of a larger math research project involving teachers, students, and parents, are an attempt to determine if teacher expectations do influence the way they interact with students, and what effect this might have on students. Another major concern to be addressed is why fewer females than males continue to take math all through high school. Do teachers treat males and females differently in ways that may discourage females in math?

Three levels of math classes, seventh, eighth, and ninth grades were observed for ten days each. The observer coded all teacher-student interactions, noting the particular student involved, who initiated the interaction, and the type of interaction it was. As much information as was possible to observe was recorded, using a low-inference method of classifying private interactions, which were simply recorded as brief or long dyads. The teacher's affect associated with public criticisms was recorded as strong, moderate, or little. Feedback provided to the student was categorized as brief or long, and if known, whether it was affirmative or negative.

Along with the classroom observations, students and teachers completed questionnaires the year of the observations and again the following year. The students' questionnaire measured their attitude toward math, their perception of their math aptitude, the value of math to them, plans to take more math, and their conception of math as a task. The teachers' questionnaire asked them to rate their expectations for each student's math performance that year, how much math aptitude the student had, and how well they thought the student would do in an advanced math course. On the basis of the teacher ratings, students were divided into high and low expectancy groups, which will be referred to as highs and lows.

The high expectancy students received higher grades in math the year of the observation and again the following years in which records of the students' grades were collected (Table 1). While teacher expectations may thus be seen simply as accurate assessments of the students' abilities, teacher expectations may also have influenced the way the teacher interacted with the student, which could affect the student's math attitude and performance.

Analyses of variance were run on the classroom observation data, grouping the students by sex and teacher

expectancy group. Significant differences were found between highs and lows and between males and females (Table 2, page 1). The comparison of high and low expectancy students revealed that high expectancy students have a higher average number of wrong answers accompanied by long or short feedback and more response opportunities with affirmative feedback. Low expectancy students, on the other hand, get more total criticism with moderate affect, more criticism related to the form of their work, and a higher percent of criticism. More of their response opportunities are accompanied by criticism than are high students'.

The students themselves contribute to their classroom interactions; not all interactions are controlled by the teacher. High expectancy students were engaged in more interactions than lows, partly because they initiated more interactions with the teacher than low expectancy students did. Since lows met with more criticism in their interactions, it is not surprising that they were less eager to initiate these interactions than were highs, who often were rewarded with long or affirmative feedback when they initiated an interaction.

In general, student-initiated interactions were positively related to the student's math attitudes. For all groups except low males, the percent of content-oriented questions asked by the student correlated positively with the student's intent to take more math, (Table 4). Student-initiated questions are obviously part of the student's contribution to their classroom interactions, but how the teacher responded to a student-initiated interaction also had an impact. Both males' and females' perception of their math aptitude correlated positively with the percent of student-initiated interactions that received long feedback (Table 4; all correlations listed in Table 4). Brief feedback in response to a student-initiated interaction, however, was negatively related to perception of aptitude, although this was significant only for females. What this suggests is that asking questions and initiating interactions enhances a student's feelings about themselves in relation to math, but only if the teacher was actively responsive and gave long feedback instead of just a short answer to the student.

The analyses of variance by sex showed that females were significantly higher than males on only one variable, percent of total work praise received. Males received more criticism, a higher average number of sustaining questions (the teacher asks the student another question), and more dyads with brief feedback.

Although getting a higher percent of praise might

suggest that females have a more favorable interaction pattern than males, this is not necessarily the case. Dyads with brief feedback, which occurred more frequently for males, were positively related to teacher expectancy the following year, although this was significant only for low males. Additionally, the effects of praise and criticism are not always in the expected directions of praise as facilitative and criticism as debilitating. While work praise was positively correlated with the following year's teacher expectancy for low females, for high females there was a positive correlation between the percent of work criticism, not praise, and the next year's teacher expectancy. The criticism may have communicated to these students that they were capable of doing better work; they may have responded to this idea by performing better and earning a higher teacher expectancy rating the next year.

What this would indicate is that the student's interpretation of any interaction is crucial to the effect of that interaction on the student. For example, as previously mentioned, the finding that long feedback in response to student-initiated interactions is facilitative did not hold for low males. In fact, it was reversed in relation to the following year's teacher expectancy rating. For low males, the percent of long feedback with a student-initiated interaction was negatively related to the following year's teacher expectation, while brief feedback was positively correlated. The explanation for this might be based on low males' overall interaction pattern, which is not very positive. They receive a lot of criticism, so for them a long interaction may have a negative meaning. Long feedback for low males could thus have a negative impact on their math attitudes, which, in turn, could lead to a lowered teacher expectancy rating the next year.

There was an interaction found between sex and teacher expectancy group (Table 2, page 2). High females were not significantly higher than low females on any of the classroom interaction variables. Low females came out significantly higher on five variables: average number of negative feedbacks, teacher-initiated dyadics, wrong student responses, teacher-initiated interactions, and response opportunities with negative feedback. The results for males were almost the opposite, with high males higher than or approximately equal to low males on these five variables, and low males not significantly higher than high males on anything.

This greater teacher attention does appear to be helpful, at least for females. For low females, response opportunities with negative feedback were positively correlated

with their concept of the value of math and with intent to take more math. The number of wrong answers was also positively correlated to the value of math for low females. For both high and low females, the number of teacher dyads was correlated positively with the following year's teacher expectancy. High expectancy females, who do have the ability to succeed in math, are not getting the teacher attention and type of interactions that lead to positive math attitudes and the intent to take more math.

For males, since there were fewer differences between highs and lows, the effect is less clear, but these variables do not appear to enhance males' math attitudes or performance. The only significant effect was that the number of wrong answers was negatively related to both high and low males' perception of their math aptitude. Wrong answers, of course, are actually under the student's control; the only influence the teacher could have on the number of wrong answers a student gives would be to vary the difficulty of the questions directed to that student.

However, for high males, wrong answers that were followed by feedback from the teacher were positively correlated to their concept of the value of math, to their perception of their ability, and to the following year's teacher expectancy rating. Feedback in response to wrong answers was also positively correlated with subsequent teacher expectation for low females. Again, what the teacher does in response to the student is important. Wrong answers by themselves have a mostly negative relationship to math-related perceptions. If the teacher gives feedback after a wrong answer, the relationship is positive.

To summarize the classroom interaction data, high expectancy students get more feedback, including more affirmative feedback, than low expectancy students. Low expectancy students receive both a higher percent and more total criticism than high expectancy students.

While females had only a higher percent of work praise than males, males received more criticism, sustaining questions, and dyads with brief feedback than females.

There is an interaction between sex and teacher expectancy group, with low females receiving more teacher attention than high females and high males receiving equal amounts or more than low males.

The students contribute to their classroom interactions in two important ways. One, students can choose

to initiate interactions with the teacher. This has a positive relationship to the student's feelings about math and their own math abilities, provided that the teacher is willing to respond to the student by giving long feedback.

The second critical student contribution is their interpretation of the teacher's interactions with them and responses to them. The teacher can also play a role in this. As an example, praise was negatively related to high males' concept of their math ability the following year. If these students had been praised for answers to very simple questions, this may have lowered their perception of how good the teacher thought they were in math, which in turn lowered their own conception of their ability. Different students may interpret the same teacher behavior in totally different ways, depending on the context in which the interaction took place and the student's overall pattern of interactions in the classroom.

The classroom interaction variables by themselves cannot account for all the differences in students' math attitudes, performance, and the decision to take or not take more math. The magnitude of the classroom effects is not large; in comparison to parents' influence, for example, the teacher's impact does not appear to be very strong.

Teachers do, however, have an impact on students, and they could have more of a positive impact. The results discussed here suggest that teachers could provide more feedback, especially more long feedback, to females to increase the likelihood of their planning to take more math. In particular, more teacher attention for high expectancy females would be helpful in this regard. For males, more affirmative feedback and less criticism would improve their classroom interaction patterns. While teachers' interactions with students seem to have a limited effect on students, they clearly do have an impact, and the opportunity is there for teachers to make that impact more positive.

References

Rosenthal, R. and Jacobson, L. Pgymalion in the classroom.
New York: Holt, Rinehart, and Winston, Inc., 1968.

Table 1

Record Data

Correlation between teacher expectancy and student performance:

.6393 ($p < .01$)

Table 2Analyses of VarianceTeacher Expectancy

		<u>F</u>	<u>signif</u>
% response opportunities with feedback	H > L	6.7106	.0099
% student-initiated dyadics	H > L	7.2535	.0073
% student-initiated questions	H > L	9.7894	.0019
% response opportunities w/ aff feedbk	H > L	6.4940	.0112
avg. wrong answer & long or short fb	H > L	8.5887	.0035
avg. response opp's & aff feedback	H > L	4.5019	.0343
% criticism	L > H	5.2660	.0221
% response opp's w/ sustaining feedbk	L > H	9.4903	.0022
avg. response opp's & criticism	L > H	5.5400	.0189
total criticism (moderate affect)	L > H	5.6545	.0178
total form criticism	L > H	4.1535	.0420

Sex

% total work praise	F > M	4.4877	.0357
% criticism	M > F	22.016	.0000
avg. sustaining questions	M > F	4.1359	.0425
avg. dyadics and brief feedback	M > F	7.9846	.0049
total criticism	M > F	34.430	.0000
total criticism (moderate affect)	M > F	32.035	.0000
total criticism (strong affect)	M > F	11.154	.0009
total work criticism	M > F	8.4925	.0037
total form criticism	M > F	8.6671	.0034
total conduct criticism	M > F	31.227	.0000

Table 2
Analyses of Variance-2
Sex, cont.

total criticism (little affect)	M > F	6.3946	<u>signif</u> .0003
avg. observed sessions	M > F	7.0890	.0080

Teacher Expectancy and Sex

avg. feedback: negate	LF > HF; HM > LM	9.090	.0027
avg. teacher dyads	LF > HF; HM = LM	6.2145	.0130
avg. wrong student response	LF > HF; HM = LM	5.3847	.0207
avg. teacher-init. interactns	LF > HF; HM = LM	5.9565	.0150
avg. response opp's & neg. fb.	LF > HF; HM $\geq$ LM	8.8945	.0030

Table 3

Variable Abbreviations Key

ACRO: average response opportunities
ACROAFF: average response opportunities with affirmation
AFF: affirmation of student response by teacher
ANYFB: any feedback
AO: ask other
BFB or BF: brief feedback
CABCN2: concept of ability
CMAPT1: concept of math aptitude
CO: call out (student answers without being called on)
CONCRIT: conduct criticism
CONSI: student-initiated interaction about content
CONTR: control (who controlled or initiated the interaction)
CORO: call out, given response opportunity
CR or CRIT: criticism
CTSKCN2: concept of math as a task
CVAL: concept of the value of math
DIR: direct question to the student
DISC: discipline
DR: direct question
DYD or DY: dyad
DYDLFB: dyad with long feedback
DYDBFB: dyad with brief feedback
FBAFF: feedback that is affirmative
FCRT: form criticism (criticism of the form of the student's work)
INTENT: student's intent to take more math
LBFB: long or brief feedback
LFB or LF: long feedback
NEG: teacher negates student response
NO: no feedback
OBSESSES: number of sessions student was observed
OPEN: open question, not directed to particular student
OPENRO: open response opportunity
PR: praise
PRO: procedure
RIG or RIGHT: right answer
RO: response opportunity
SI: student-initiated interaction
SIBF: student-initiated interaction with brief feedback
SILF: student-initiated interaction with long feedback
SIQCON: student question on content
SR: self-reference question
STCONTR: student controlled or initiated interaction
STDYD: student-initiated dyad
SUS: sustaining question; student is given another question
TCHCEXP2: child's perception of teacher expectancy
TCONTR: teacher controlled interaction
TDYD: teacher-initiated dyad
TEXSTDY2: teacher expectancy year 2
TOT: total
TOTCONCR: total conduct criticism

Table 3, cont.

WKPR: work praise

WRKCRT: work criticism

WRG or WRONG: wrong answer

1 indicates strong affect associated with praise or criticism

2 indicates moderate affect associated with praise or criticism

3 indicates little or no affect associated with praise or criticism

% : percent of student's interactions that were that type of interaction

Table 4

Correlations

	<u>Females</u>	<u>Males</u>
<u>CVAL:</u>	SIBF% .1913 NO% .1976 DIR .1844 TEXSTDY2 .1814	TEXSTDY2 .2969
<u>INTENT:</u>	CONSI% .2554 -SIBF% -.2199 SILF% .2354 TEXSTDY2 .1880	-SUS% -.2197 -SUS -.2412 -ROCRIT -.1860 -TOTWKCR -.1965
<u>CABCN2:</u>	TEXSTDY2 .4911	OPEN% .1834 TEXSTDY2 .6007
<u>CTSKCN2:</u>	SR% .1858 -FCR% -.1871 SI% .2179 SIQCON .2081 SR .2133 CO .1862 TOTSI .2021 SI&ANYFB .2057 -TEXSTDY2 -.3023	SI% .1949
<u>CMAPT1:</u>	CONSI% .2525 -SIBF% -.3266 SILF% .3068 -DYBFB% -.1547 DYLFB% .1896 -SUS% -.1968 -SUS -.2043	SILF% .2520 -SUS% -.3346 AFF% .3170 -STDYD -.2221 -WRG -.2088 -SR -.2256 -SUS -.2895 -RIG&PR -.2698 -RIGLBFB -.2982 -WRG&LBFB -.1998 -DYD&BFB -.2439 -RO&PR -.3003 -DY&ANYFB -.2194 -TOTPR -.2460 -TOTCR1 -.1862 -TOTCR2 -.2527 -TOTWKPR -.2566 -TOTWKCR -.1732 -TOTCONCR -.2286 -STCONTR -.2040 -TCONTR -.2045 -TOTDYD -.2164 -OBSESSES -.2662 -TOTCRIT -.2485 -TOTPR1 -.2301 TEXSTDY2 .4904

 All correlations significant
 at $p \leq .05$

Table 4

Correlations - 2

	<u>Females</u>		<u>Males</u>	
<u>TCHEXP2:</u>	SDY%	.1884	OPEN%	.1883
	TEXSTDY2	.2079	TEXSTDY2	.4419
<u>TEXSTDY2:</u>	-TDYD	-.2335		
	AO%	.1813		
	-SUS%	-.2377		
	SDY%	.2270		
	WKPR%	.1902		
	ACROFB%	.2276		

Table 4
Correlations - 3

	<u>Low Females</u>		<u>High Females</u>	
<u>CVAL:</u>	-ACROFB%	-.2343	-ACROFB%	-.1861
	-SIBF%	.2827	NO%	.1959
	-SILF%	-.3001	TEXSTLY2	.2365
	NO%	.2142	STDYD	.2259
	NEG%	.3086	DYD&LFB	.2003
	FBNEG	.2550	DY&ANYFB	.2228
	WRONG	.2366	TOTDYD	.2228
	DIR	.2834	OBSSSES	.1918
	CO	.2158		
	DIRRO	.2687		
	CORO	.1882		
	TCONTR	.2557		
	ACRONEGFB	.2479		
<u>INTENT:</u>	CONSI%	.2780	TEXSTDY2	.2871
	WKPR%	.4304	CONSI%	.2516
	FBNEG	.1802	-SIBF%	-.3026
	NEG%	.2880	DYLFB%	.1812
	ACRONEGFB	.1963	-DYBFB%	-.2054
			SILF%	.3195
<u>CABCN2:</u>	-SR%	-.1890	-DIR%	-.2151
	-ACROFB%	-.2179	-WKCR%	-.2020
	CRIT%	.2104	-SUS%	-.2341
	DYBFB%	.2331	RO&ANTFB	.1825
	-DYLFB%	-.2725	TEXSTDY2	.3580
	NO%	.1901		
	NEG%	.2105		
	DIRRO	.1943		
	-DYDLFB	-.1862		
	TOTCR1	.1807		
	TOTCONCR	.2227		
	TOTCRIT	.1957		
	TOTPR1	.1638		
<u>CTSKCN2:</u>	-TEXSTDY2	-.2350	-ACROFB%	-.1851
	SR%	.2927	WKCR%	.2142
	ACROFB%	.1900	-FCR%	-.2163
	-PR%	-.2001	SI%	.2078
	-CRIT%	-.3588	-FBAFF	-.2105
	WKPR%	.2415	SIQCON	.2151
	SIBF%	.3129	-OPENRO	-.2299
	-SILF%	-.3634	SIQLFB	.2039
	-DYBFB%	-.3171	-RO&ANYFB	-.2230
	DYLFB%	.3533	SI&ANTFB	.2049
	SI%	.4484	-TOTPR	-.1981
	SIQCON	.2620	TOTSI	.2068
	SIQPRO	.1937	-ACROAFFB	-.2169
	SR	.2928		
	CO	.2380		

Table 4

Correlations - 4

	<u>Low Females</u>	<u>High Females</u>
<u>CTSKCN2:</u> (cont.)	RIG&LBFB .2661 SIQBFB .3147 DYDLFB .2352 SI&ANYFB .2808 -TOTPR -.1952 -TOTCR -.2481 -TOTCR1 -.2117 -TOTCONCR -.2739 STCONTR .2767 TOTSI .2729	
<u>CMAFT1:</u>	TEXTDY2 .4425 CONSI% .2343 PR% .1965 -SIBF% -.3207 SILF% .3642 DYLF% .1824 -DYD&BFB -.2118 -TOTCR2 -.1882	TEXTDY2 .3081 -ACRO% -.1802 CONSI% .3259 -OPEN% -.1855 -SIBF% -.4117 SILF% .3710 SIQLFB .2228 DYLF% .2015 -DYBFB% -.2170
<u>TCHEXP2:</u>	-DIR% -.1895 OPEN% .2007 CRIT% .2465 -WKCRIT% -.2690 WKPR% .2519 AFF% .2025 FBAFF .2335 RIGHT .1853 WRG&LBFB .1889 OPENRO .2317 RO&ANYFB .1819 TOTCRIT .2336 TOTCRIT3 .2096 TOTCONCR .2471 ACROAFFB .2240 WKCRIT% .2362 SDY% .1883	SDY% .1883 WKCR% .2362
<u>TEXTDY2:</u>	-TOTWKCR -.2196 -SUS% -.1944 SILF% .2300 -SIBF% -.2481 -WKCR% -.3525 ACROFB% .2204 CONSI% .1847	

Table 4
Correlations - 5

	<u>Low Males</u>		<u>High Males</u>	
<u>CVAL:</u>	-SUS%	-.2505	-CO%	-.2067
	CO	.1860	WRG&LBFB	.2134
			TEXSTDY2	.2507
<u>INTENT:</u>	CO%	.2166	CONSI%	.2568
	-WKCR%	-.2268	-SUS%	-.2108
	-SUS%	-.2031	-NO%	-.1945
	-AO%	-.2245	-SUS	-.1919
	-SUS	-.3183	-TOTWKCR	-.2370
	-RO&CRIT	-.2595		
	-TOTWKCR	-.1864		
<u>CABCN2:</u>	TEXSTDY2	.3882	TEXSTDY2	.4399
	DISC%	.2402	OPEN%	.2307
	-AO%	-.2694	-CO%	-.2832
	-NEG%	-.1959	-WKPR%	-.2426
	AFF%	.2041	-SILF%	-.2598
	-RIGPR	-.1833	-SI%	-.2840
	-ROPR	-.1920	-CO	-.2126
			WRG&LBFB	.2398
			-COFB	-.2201
<u>CTSKCN2:</u>	-PR%	-.2802	-TEXSTDY2	-.1935
	-CRIT%	-.2172	-DYD%	-.2209
	WKCR%	.2087	SR%	.2157
	SDY%	.2974	SI%	.1983
	STDYD	.2224	CO	.2013
	SIQCON	.2010		
	SUS	.1941		
<u>CMAPT1:</u>	AFF%	.3223	TEXSTDY2	.3804
	-FBAFFRO	-.1938	-SR%	-.2044
	-STDYD	-.3112	CONSI%	.2077
	-RIGHT	-.3472	-DISC%	-.1853
	-WRONG	-.2466	FCR%	.2440
	-SR	-.2204	SILF%	.2195
	-DR	-.1940	-DYBFB%	-.2472
	-OPEN	-.2562	DYLF%	.2563
	-SUS	-.4756	-SUS%	-.2504
	-RIGLB	-.3568	AFF%	.1973
	-RIGPR	-.1129	-SIQPRO	-.2463
	-WRG&LBFB	-.2159	-WRONG	-.2013
	-OPENRO	-.2070	-SUS	-.2286
	-DYDBFB	-.3039	-RIGHT&LFB	-.2928
	-DYDLFB	-.2824	-RO&PR	-.2230
	-RO&PR	-.4333		
	-RC&ANYFB	-.3068		
	-DY&ANYFB	-.3136		
	-TOTPR1	-.2029		

Table 4

Correlations - 6

	<u>Low Males</u>	<u>High Males</u>
<u>CMAPT1:</u> (cont.)	-TOTPR2 -.2029 -TOTCR1 -.2836 -TOTCR2 -.2562 -TOTCR3 -.3120 -TOTWKPR -.3324 -TOTFRMCR -.1960 -TOTCONCR -.3050 -STCONCR -.2906 -TCONTR -.3256 TOTDYD .3122 -OBSSSES -.4196 -TOTRO -.3560 -ACROAFFB -.1931 -TOTPR -.3206	
<u>TCHEXP2:</u>	.TEXSTDY2 .3990 -CONSI% -.2468 -FCRT% -.2123 -AO% -.2167 FBAFF .1991 DIR .1880 OPENRO .1995 TOTRO .1935 ACROAFFB .2048	WRG&LBFB .2119 -SILF% -.2299 TEXSTDY2 .1958
<u>TEXSTDY2:</u>	TOTWKCR .1824 -DYLFB% -.1988 DYBFB% .1983 -SILF% -.3724 SIBF% .3466	-CONCR% -.1922